AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions, and listings, of claims in the application.

1. (Currently amended): A diagnostics and control system for controlling a motorized system and diagnosing the health thereof, comprising:

a controller ~~operatively associated with the motorized system and adapted to~~ that operates the motorized system in a controlled fashion; and

a diagnostics system integrated with the controller ~~operatively associated with the motorized system and adapted to~~ that diagnoses the health of the motorized system according to a measured attribute associated with the motorized system, the diagnostics system providing a diagnostic signal to the controller.

2. (Currently amended): The diagnostics and control system of claim 1, ~~wherein~~ the measured attribute comprises at least one of vibration, pressure, current, speed, and temperature.

3. (Currently amended): The diagnostics and control system of claim 1, ~~wherein~~ the motorized system comprises a motor and a load, ~~and wherein~~ the load comprises at least one of a valve, a pump, a conveyor roller, a fan, a compressor, and a gearbox.

4. (Currently amended): The diagnostics and control system of claim 1, ~~wherein~~ the diagnostics system provides a diagnostics signal according to the health of the motorized system, and ~~wherein~~ the controller provides a control signal to the motorized system according to at least one of a setpoint and the diagnostics signal.

5. (Currently amended): The diagnostics and control system of claim 1, ~~wherein~~ the measured attribute comprises at least one vibration signal obtained from a sensor associated with a motor in the motorized system.

6. (Currently amended): The diagnostics and control system of claim 5, ~~wherein~~ the diagnostics system ~~is adapted to~~ diagnoses the health of at least one of a motor bearing, motor shaft alignment, and motor mounting according to the measured vibration.

7. (Currently amended): The diagnostics and control system of claim 6, ~~wherein~~ the diagnostics system ~~is adapted to~~ performs frequency spectral analysis of the vibration signal.

8. (Currently amended): The diagnostics and control system of claim 7, ~~wherein~~ the diagnostics system comprises at least one of a neural network and an expert system, ~~and wherein~~ the diagnostics system provides a diagnostics signal indicative of the health of the motorized system according to frequency spectral analysis of the measured vibration signal using the at least one of a neural network and an expert system.

9. (Currently amended): The diagnostics and control system of claim 8, ~~wherein~~ the controller provides a control signal to the motorized system according to at least one of a setpoint and the diagnostics signal.

10. (Currently amended): The diagnostics and control system of claim 1, ~~wherein~~ the motorized system comprises a motorized pump, ~~wherein~~ the measured attribute comprises at least one vibration signal obtained from a sensor associated with the pump, and ~~wherein~~ the diagnostics system ~~is adapted to~~ diagnoses the health of the pump according to the measured vibration.

11. (Currently amended): The diagnostics and control system of claim 10, ~~wherein~~ the diagnostics system ~~is adapted to~~ performs frequency spectral analysis of the vibration signal.

12. (Currently amended): The diagnostics and control system of claim 11, ~~wherein~~ the diagnostics system comprises at least one of a neural network and an expert system, and ~~wherein~~ the diagnostics system provides a diagnostics signal indicative of the health of the pump according to frequency spectral analysis of the measured vibration signal using the at least one of a neural network and an expert system.

13. (Currently amended): The diagnostics and control system of claim 12, ~~wherein~~ the controller provides a control signal to the motorized system according to at least one of a setpoint and the diagnostics signal.

14. (Currently amended): The diagnostics and control system of claim 12, ~~wherein~~ the diagnostics system employs data fusion techniques in order to derive the at least one vibration signal from at least one sensor associated with the motorized system.

15. (Currently amended): The diagnostics and control system of claim 1, ~~wherein~~ the motorized system comprises a motorized pump, ~~wherein~~ the measured attribute comprises a current associated with a motor in the motorized system, and ~~wherein~~ the diagnostics system provides a diagnostics signal indicative of pump cavitation according to the measured current.

16. (Currently amended): The diagnostics and control system of claim 15, ~~wherein~~ the diagnostics system comprises a neural network ~~adapted to~~ that synthesizes a change in condition signal from the measured current.

17. (Currently amended): The diagnostics and control system of claim 16, wherein the diagnostics system comprises:

a preprocessing portion operatively coupled to the neural network, the preprocessing portion ~~adapted to~~ conditions the measured current prior to inputting the current into the neural network; and

a post processing portion operatively coupled to the neural network, the post processing portion ~~adapted to~~ determines whether the change in condition signal is due to a fault condition related to the motorized system.

18. (Currently amended): The diagnostics and control system of claim 17, ~~wherein~~ the post processing portion is a fuzzy rule based expert system.

19. (Currently amended): The diagnostics and control system of claim 18, ~~wherein~~ the diagnostics system ~~is adapted to~~ detects at least one fault relating to the operation of the pump

and at least one fault relating to the operation of the motor driving the pump according to the measured current.

20. (Currently amended): The diagnostics and control system of claim 1, ~~wherein~~ the diagnostics system ~~is adapted to~~ obtains a space vector angular fluctuation from a current signal relating to operation of the motor, and ~~to~~ analyzes the space vector angular fluctuation in order to detect at least one fault in the motorized system.

21. (Currently amended): The diagnostics and control system of claim 20, ~~wherein~~ the diagnostics system ~~is adapted to~~ obtains a current signal associated with the motor, ~~to~~ calculates a space vector from the current signal, ~~to~~ determines a space vector angular fluctuation from the space vector, and ~~to~~ analyzes the space vector angular fluctuation in order to detect the at least one fault associated with the motor.

22. (Currently amended): The diagnostics and control system of claim 21, ~~wherein~~ the diagnostics system ~~is adapted to~~ samples first, second, and third phase current signals associated with the motorized system in order to obtain the current signal, ~~to~~ calculates first, second, and third phase space vectors according to the first, second, and third phase current signals, respectively, and ~~to~~ calculates the space vector by summing the first, second, and third phase space vectors, in order to calculate the space vector from the current signal.

23. (Currently amended): The diagnostics and control system of claim 22, ~~wherein~~ the diagnostics system ~~is adapted to~~ performs a comparison of the space vector with a reference space vector, wherein the reference space vector is a function of a constant frequency and amplitude, and ~~to~~ computes angular fluctuations in the space vector according to the comparison, in order to determine the space vector angular fluctuation.

24. (Currently amended): The diagnostics and control system of claim 23, ~~wherein~~ the diagnostics system ~~is adapted to~~ computes a polynomial expansion of an arctangent function in order to compute angular fluctuations in the space vector.

25. (Currently amended): The diagnostics and control system of claim 24, ~~wherein~~ the diagnostics system ~~is adapted to~~ performs frequency spectrum analysis of the space vector angular fluctuation in order to analyze the space vector angular fluctuation in order to detect at least one fault associated with the motorized system.

26. (Currently amended): The diagnostics and control system of claim 25, ~~wherein~~ the diagnostics system ~~is adapted to~~ computes a frequency spectrum of the space vector angular fluctuation, and ~~to~~ analyzes the amplitude of a first spectral component of the frequency spectrum at a first frequency in order to perform frequency spectrum analysis of the space vector angular fluctuation.

27. (Currently amended): The diagnostics and control system of claim 26, ~~wherein~~ the diagnostics system ~~is adapted to~~ analyzes fluctuations in amplitude of the first spectral component in order to detect at least one fault associated with the motorized system.

28. (Currently amended): The diagnostics and control system of claim 27, ~~wherein~~ the first frequency is approximately twice the frequency of power applied to a motor in the motorized system.

29. (Currently amended): The diagnostics and control system of claim 28, ~~wherein~~ the diagnostics system ~~is adapted to use~~ utilizes a Goertzel algorithm to extract the amplitude of the first spectral component in order to analyze the amplitude of the first spectral component.

30. (Currently amended): The diagnostics and control system of claim 29, ~~wherein~~ the at least one fault comprises at least one of a stator fault, a rotor fault, and an imbalance in the power applied to the motor in the motorized system.

31. (Currently amended): The diagnostics and control system of claim 1, ~~wherein~~ the diagnostics system comprises at least one of a neural network, an expert system, and a data fusion component.

32. (Currently amended): A method of controlling a motorized system and diagnosing the health thereof, comprising:

operating a motor in the motorized system in a controlled fashion; ~~and~~

utilizing a component integrated with a controller to diagnose ~~diagnosing~~ the health of the motorized system according to a measured attribute associated with the motorized system; and

generating a diagnostics signal communicated to the [[a]] controller.

33. (Original): The method of claim 32, further comprising providing a diagnostics signal indicative of the health of the motorized system, wherein operating the motor comprises controlling the motor according to at least one of a setpoint and the diagnostics signal.

34. (Original): The method of claim 33, further comprising measuring an attribute associated with the motorized system, wherein providing the diagnostics signal comprises obtaining a frequency spectrum of the measured attribute and analyzing the frequency spectrum in order to detect at least one fault in the motorized system.

35. (Original): The method of claim 34, wherein providing the diagnostics signal comprises computing a space vector angular fluctuation, obtaining a frequency spectrum of the space vector angular fluctuation, and analyzing the amplitude of a first spectral component of the frequency spectrum at a first frequency.

36. (Original): The method of claim 32, wherein diagnosing the health of the motorized system according to a measured attribute associated with the motorized system comprises:

providing the measured attribute to at least one of a neural network, an expert system, and a data fusion component; and

providing a diagnostics signal indicative of the health of the motorized system from the at least one of a neural network, an expert system, and a data fusion component.

37. (Original): The method of claim 36, wherein operating the motor comprises controlling the motor according to at least one of a setpoint and the diagnostics signal.

38-40. (Cancelled)

41. (Currently amended): An integrated control and diagnostics system for a motor, the system comprising:

a diagnostics module to generate a health assessment signal indicative of the health of the motor; and

a controller integrated with the diagnostics module and coupled to the motor, ~~said~~ the controller outputting a driving output based on ~~said~~ the health assessment signal, ~~wherein said~~ the driving output is applied to the motor.

42. (Currently amended): The control and diagnostics system according to claim 41, ~~wherein said~~ the diagnostics module generates ~~said~~ the health assessment signal at least partially based on ~~said~~ the driving output produced by ~~said~~ the controller.

43. (Currently amended): The control and diagnostics system according to claim 41, ~~wherein said~~ the controller is associated with at least one controllable parameter, ~~said~~ the parameter being controllable in response to ~~said~~ the health assessment signal.

44. (Cancelled)

45. (Currently amended): The control and diagnostics system according to claim 41, further including at least one sensor, ~~said~~ the sensor generating a signal indicative of a parameter associated with the motor, ~~wherein~~ the health assessment signal is based on the sensor signal.

46. (Currently amended): The control and diagnostics system according to claim 45, ~~wherein said~~ the controller includes a velocity feedback loop and a torque feedback loop.

47. (Currently amended): The control and diagnostics system according to claim 46, ~~wherein said~~ the velocity feedback loop generates a current reference signal in response to the sensor

signal, and ~~said~~ the torque feedback loop generates the driving output in response to the current reference signal.

48. (Currently amended): The control and diagnostics system according to claim 47, ~~wherein said~~ the velocity feedback loop includes a P-I controller to generate the current reference signal.

49. (Currently amended): The control and diagnostics system according to claim 45, ~~wherein said~~ the motor parameter is one of a group consisting of velocity and vibration.

50-52. (Cancelled)

53. (Currently amended): The control and diagnostics system according to claim 41, ~~wherein said~~ the diagnostics module includes an ASIC that generates the health assessment signal based on a process constraint.

54. (Currently amended): The control and diagnostics system according to claim 42, ~~wherein said~~ the health assessment signal is indicative of whether the motor is deviating from a normal operating characteristic.

55. (Currently amended): The control and diagnostics systems according to claim 41, further comprising a coordination module coupled to a plurality of the control and diagnostics systems, ~~wherein said~~ the coordination module alters the driving output associated with one of the control and diagnostics systems based on the driving output of another one of the control and diagnostics systems.

56. (Cancelled)

57. (New) An integrated control and diagnostics system, comprising:

means for controlling a motorized system utilizing a health assessment signal indicative of the health of the motorized system; and

means for generating the health assessment signal, the means for generating integrated with the means for controlling.

58. (New) A composite control and diagnostics system to control a motor, comprising:

means for effectuating movement of the motor in a controlled fashion based in part on a health assessment signal;

means for formulating the health assessment signal, the means for effectuating movement and the means for formulating the health assessment signal forming an integrated unit.

59. (New) An integrated control and diagnostics system, comprising:

means for diagnosing the health of a motorized system integrated with a means for controlling the motorized system, the means for diagnosing producing a signal; and

means for communicating the signal to the means for controlling.